

METHOD OF REDUCING ELECTROMIGRATION IN A COPPER LINE
BY ELECTROPLATING AN INTERIM COPPER-ZINC ALLOY THIN FILM
ON A COPPER SURFACE AND A SEMICONDUCTOR DEVICE THEREBY FORMED

ABSTRACT OF DISCLOSURE

A method of fabricating a semiconductor device, having an interim reduced-oxygen Cu-Zn alloy thin film (30) electroplated on a blanket Cu surface (20) disposed in a via (6) by electroplating, using an electroplating apparatus, the Cu surface (20) in a unique chemical solution containing salts of Zn and Cu, their complexing agents, a pH adjuster, and surfactants; and annealing the interim electroplated Cu-Zn alloy thin film (30); filling the via (6) with further Cu (26); annealing and planarizing the interconnect structure (35); and a semiconductor device thereby formed. The reduction of electromigration in copper interconnect lines (35) is achieved by decreasing the drift velocity in the copper line (35) / via (6), thereby decreasing the copper migration rate as well as the void formation rate, by using an interim conformal Cu-rich Cu-Zn alloy thin film (30) electroplated on a Cu surface (20) from a stable chemical solution, and by controlling the Zn-doping thereof, which improves also interconnect reliability and corrosion resistance.